

A new species of *Utricularia* (Lentibulariaceae) from northern Queensland, Australia

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Abstract

Utricularia blackmanii R.W.Jobson from igneous regions in northern Queensland (Australia) is described as new and is considered to be a member of *Utricularia* subg. *Polypompholyx* section *Pleiochasia*. The distribution and habitat preferences of this species are described and the morphological differences between *U. blackmanii* and the species with which it was confused previously are discussed. Specifically, this new species is distinguished from *U. dichotoma* Labill., *U. hamiltonii* F.Lloyd, *U. fistulosa* P.Taylor, *U. singeriana* F.Muell., *U. terrae-reginae* P.Taylor, *U. triflora* P.Taylor, and *U. tubulata* F.Muell. by means of a diagnostic key.

Introduction

The genus *Utricularia* L. (Lentibulariaceae) contains 214 monographed species worldwide, with c. 62 (47 endemic) of these found in Australia (Taylor 1989). The genus is divided into the three subgenera *Polypompholyx*, *Bivalvaria*, and *Utricularia* (sensu Müller & Borsch 2005); the former containing three sections with all but one of the c. 39 species being endemic to Australia, and the latter two containing 35 sections with c. 178 species (Taylor 1989; Gassin 1993; Lowrie 1998, 2002; Lowrie et al. 2008).

Based on the combination of peduncles that lack scales, bladder-traps with a single unbranched dorsal appendage and calyx lobes equal two, *Utricularia blackmanii* (Fig. 1) is considered a member of sect. *Pleiochasia* (subg. *Polypompholyx*) (Reut & Jobson 2010). Within sect. *Pleiochasia*, *U. blackmanii* is found to always have a hollow peduncle; a synapomorphy for members of the 'group B' clade (Reut & Jobson 2010, fig. 1) that consists of taxa distributed across northern Australia (Fig. 2).

When morphological characters are compared with these allied species, as described by Taylor (1989), it is clear that *U. blackmanii* is distinct from *Utricularia hamiltonii* F.Lloyd (Taylor 1989, fig. 17, p. 126), *U. fistulosa* P.Taylor (ibid., fig. 22, p. 136), *U. singeriana* F.Muell. (ibid., fig. 21, p. 134), *U. terrae-reginae* P.Taylor (ibid., fig. 11, p. 112), *U. triflora* P.Taylor (ibid., fig. 18, p. 128), and *U. tubulata* F.Muell. (ibid., fig. 23, p. 138) (Fig. 4a–f), and is not closely allied with *U. dichotoma* (ibid., fig. 10, p. 109) (Fig. 5).

The first recorded collection of *Utricularia blackmanii* was made by Archibald Blackman in July 1906 (*A.H. Blackman s.n.*, BRI-AQ53148) in the Newcastle Range, E of Forsyth, Queensland, Australia. There have been 15 subsequent collections from widely separated areas between 16.3–19.9° S, and 142.4–146.2° E (Fig. 2).

In July 1980, Peter Taylor determined a specimen of *U. blackmanii* from c. 60 km NNW of the Valley of Lagoons homestead (*Lazarides 8158*) as “*U. sp. nova* P. Taylor”, only to re-determine it as *U. dichotoma* Labill. (June 1985) while preparing the description of this species for his monograph (Taylor 1989).

Several years later, in an undated hand-written letter (c. 1987) that is attached to a specimen of *U. dichotoma* collected in the Far North Western Plains, N.S.W. (*Jacobs 4943*), Peter Taylor stated, based solely on the minimal projection of the bract below the point of attachment, that he “did at one time consider [it] to be perhaps a distinct species”, but decided to include it “in a very variable *U. dichotoma*”. This statement is partly in reference to specimens of *U. blackmanii* collected near Croydon, Queensland (*Blake 19585*, *Speck 4725*), but also applies to other specimens of *bona fide U. dichotoma* such as *Jacobs 4943*, as well as *Crisp 2971* from the Blackdown Tablelands, Queensland.

The characters that might best have helped Taylor to determine the identity of this taxon were the shape and colour of the base of the lower lip (i.e. five white, raised ridges), but these features are difficult to observe in dried specimens and only rarely recorded at the time of collection. Even so, several collectors of *U. blackmanii* have noted the striking white mark at the base of the lower lip (eg. *Blake 19585*, *Wannan 1163*, *Carlquist 15226*, and *Kahler & Appelman TH5056*) and it was these descriptions of the corolla that prompted my own field investigations of *U. blackmanii*.

Accordingly, the new taxon is named and compared with the morphology of related species, for which distinguishing characters are presented in a discussion and diagnostic identification key. This paper also provides notes on its phenology, distribution, ecology, and conservation status. Terminology follows Taylor (1989).

Methods

Relevant dried and alcohol-preserved material representing all related species, held at the National Herbarium of New South Wales (NSW), Queensland Herbarium (BRI), Australian National Herbarium (CANB), Northern Territory Herbarium (DNA), Western Australia Herbarium (PERTH), State Herbarium of South Australia (AD), and the National Herbarium of Victoria (MEL) were examined. Fresh material of *U. blackmanii* was also studied. Seed and pollen characteristics were investigated using a standard compound microscope (magnification $\times 100$). The distribution map (Fig. 2) and all associated data were generated and downloaded from the ‘Atlas of Living Australia’ web site [<http://spatial.ala.org.au/>].

Taxonomy

Utricularia blackmanii R.W.Jobson, *sp. nov.*

Diagnosis: *U. triflorae* affinis sed cristis in labio inferiore corollae manifeste elevatis differt.

Type: Australia: Queensland: Cook: 100 Mile Swamp, E of Mt Surprise (18.205° S, 144.574° E), 20 May 2011, R.W. Jobson 1253 (holo: NSW; iso: BRI, K, DNA).

Small to medium-sized perennial, terrestrial herb. Rhizoids capillary, simple, up to 10 mm long 0.1–0.3 mm thick, numerous from base of peduncle, with one or a few from nodes of stolon. Stolons numerous, filiform, c. 0.3 mm thick, branched, up to 100 mm long, internode length 12 mm long. Leaves numerous, several from base of peduncle and often in pairs (sometimes in threes) from stolon internodes, petiolate; lamina 0.5–1 mm wide, c. 8–20 mm long, linear to narrowly obovate, single nerve, apex rounded. Traps stalked, numerous at base of peduncle and up to three at nodes of stolon, \pm uniform, ovoid, 2–2.5 mm long; mouth lateral, with a simple subulate dorsal appendage 18–22 mm long; two lateral appendages somewhat flattened, weakly lacinate at apex, ventral wings fimbriate or rarely entire. Inflorescence erect, solitary 60–340 mm long; peduncle terete, glabrous, hollow, 0.3–1.2 mm thick. Scales absent. Bracts and bracteoles 0.5–2 mm long, \pm similar, basifixed, slightly gibbous at base, ovate-deltoid with apex acute. Flowers 2–6, in opposite pairs or whorls of three on an elongated racemose axis, pedicels erect, tapering apically, dorsiventrally flattened, 2–7 mm long. Calyx lobes unequal; upper lobe c. 2 mm long, 2.5 mm wide, broadly ovate with apex rounded; lower lobe c. 2 mm long 1.7 mm wide with apex emarginate. Corolla light violet; lower lip 6–9 mm long with five white raised ridges at base, bordered marginally by a slightly darker violet band, two outer ridges c. $\frac{1}{4}$ length of three central ridges, the central ridge sometimes c. $\frac{1}{4}$ longer than neighbouring ridges; upper lip constricted at middle, at which point it is reflexed to c. 90 degrees, superior part obovate with apex emarginate or slightly bilobed, inferior part broadly ovate, ciliate towards margin. Lower lip with limb transversely elliptic, apex rounded, weakly 3-lobed; palate pubescent, with a marginal rim; spur subulate, straight or curved forwards near apex, widely diverging



Fig. 1. *Utricularia blackmanii* **a**, habit; **b**, leaf; **c**, bracts & bracteoles with pedicel base *in situ*; **d**, stolon node; **e**, bladder-trap in lateral view; **f**, flower in frontal view; **g**, flower in dorsal view; **h**, flower in lateral view; **i**, stamen; **j**, upper lip of corolla; **k**, seed; **l**, fruiting capsule with calyx. Scale bars: **a** = 60 mm; **b**, **j**, **l** = 5 mm; **c** = 3 mm; **d**, **k** = 6 mm; **e** = 2.4 mm; **f**–**h** = 10 mm; **i** = 2 mm. Material used: **a**, **k** = *Jobson 1253* (NSW877562); **f**–**h** = photograph of living collection, *Jobson 1253*; **b**–**e**, **i**–**j** = *Jobson 1253* (alcohol preserved material – NSW921352); **l** = *Fensham 4638* (BRI–AQ499114).

from, and approximately as long as lower-lip. Staminal filaments curved, c. 0.1 mm long, anther thecae sub-distinct. Ovary ovoid, c. 0.1 mm long; style short (half as long as ovary); stigma with lower lip transversely elliptic, upper lip smaller, deltoid. Capsule globose, 2–4 mm diam.; walls thin, dehiscing by a single, ventral, longitudinal, marginally thickened slit. Seeds cylindrical, c. 0.5 mm long, 0.2 mm wide. Pollen: 3-colporate, c. $25 \times 25 \mu\text{m}$ (Jobson 1253, NSW877562).

Specimens examined: Queensland: Burke: SE of Croydon, *Blake 19585*, 17 Jul 1954 (BRI-AQ389854); SE of Croydon Township, *Speck 4725*, 17 Jul 1954 (CANB96177); **Cook:** Hanns Tableland, *Jago 4331*, 3 May 1997 (BRI-AQ663340); Messmate Spring, Whitewater, E of Mt Surprise, *Fensham 4492*, 2 Jun 2001 (BRI-AQ498872); Pretty Plains, NNW of Valley of Lagoons homestead, *Lazarides 8158*, 9 Aug 1976 (CANB265007); Swamp near Undara lodge, *Wannan 1163*, 2 Apr 1999 (BRI-AQ719529, NSW603288); Middle Granites, Undara National Park, SE of Mt Surprise, *Cumming & Smith 25117*, 24 Mar 2008 (BRI-AQ840616); Newcastle Range, *Blackman s.n.*, Jul 1906 (BRI-AQ53148); On road to Yarama, S of the Gulf Development Rd turnoff, *Jobson 1254*, 20 May 2011 (NSW877567); **North Kennedy:** Between Millstream Falls and Mt Garnet, *Carlquist 15226*, 5 Jul 1977 (BRI-AQ324188); Spyglass, N of Charters Towers, *Fensham 4547*, 16 Jul 2001 (BRI-AQ499057); Dotswood, NW of Townsville, *Fensham 4638*, 13 Aug 2001 (BRI-AQ499114); Hann Highway towards 'Clarke Hills', *Bean 12260*, 9 Aug 1997 (BRI-AQ661424); ESE of Kings Knob, Reedy Springs, *Kahler & Appelman TH5056*, 26 Mar 2002 (BRI-AQ771583); South-west of Ross River Dam, Townsville, *Danielsen 70509*, 7 May 2009 (BRI-AQ871957).

Additional specimens referenced: Utricularia dichotoma: Queensland: Leichhardt: Expedition Range, Blackdown Tableland, *Crisp 2971*, 12 Jun 1977 (BRI-AQ0321920); 'Pony Hills', E of Injune, *Jobson 1305* (NSW886098). **New South Wales: North Far Western Plains:** Peery Lake, *Jacobs 4943*, 4 Nov 1986 (NSW251155).

Etymology. The specific epithet refers to Archibald Hugh Blackman who in 1906 collected the first recorded specimen in the Newcastle Range, E of Forsayth. He was born in Queensland in 1868, the son of Frederick Archibald Blackman, owner of 'Warro' station and avid herpetologist. Archibald Hugh Blackman was a surveyor in the field staff of the Queensland Chief Engineer's branch. He died in Queensland in 1923 (pers. correspondence from Dr Glenn Shea, Australian Museum).

Phenology. Flowers and fruits recorded from March until August. Seed-set has been observed in two specimens: *Jobson 1253* (type) and *Fensham 4638*, representing a northern and southern population respectively. Observation of recent flowering in cultivated material derived from the type location indicates that autogamy is not a primary means of fertilisation. A faint sweet fragrance emanates from freshly-opened flowers.

Distribution and Ecology. Australia: Queensland: Burke, Cook and North Kennedy districts (endemic to the Einasleigh Uplands bioregion). Recorded north to Hann Tableland NW of Mareeba (alt. 400 m), and south to 19.9° S, just north of Reedy Springs, c. 360 km west of Bowen (*Kahler & Appelman TH5056*) (Fig. 2).

Distribution is mostly at elevations between 350–900 m, on basalt tablelands of various volcanic provinces and associated lava fields (Zhang *et al.* 2000), both north and south of Atherton, and the most westerly populations, from ~30 km SE of Croydon, are found on an igneous province elevated between 200–300 m (Fig. 2).

This species is usually uncommon locally, inhabiting permanently wet *Melaleuca*-fringed swamps, or ephemerally wet springs, creek-lines, and boggy savannah grasslands. It often grows in open woodland (including *Corymbia* and/or *Eucalyptus*) on sandy mud, gilgais on clay plains, or on weathered granite substrate in alluvial flood areas (Fig. 3). Populations are often found in association with grasses, sedges, *Xyris* spp, *Drosera* spp, *Utricularia* spp, in woodlands dominated by one or several of the following species: *Corymbia clarksoniana* (D.J.Carr & S.G.M.Carr) K.D.Hill & L.A.S.Johnson, *C. ellipsoidea* (D.J.Carr & S.G.M.Carr) K.D.Hill & L.A.S.Johnson, *C. tessellaris* (F.Muell.) K.D.Hill & L.A.S.Johnson, *Eucalyptus camaldulensis* Dehnh., *E. creba* F.Muell., *E. platyphylla* F.Muell., *Melaleuca bracteata* F.Muell., and *M. viridiflora* Sol. ex Gaertn.

Conservation Status. Although *U. blackmanii* has a wide distribution across northern Queensland (Fig. 2), it is mainly restricted locally to isolated, ephemeral swampy habitats (Fig. 3). Most previous collections were made on private or crown land, with one of these (*Jago 4331*) collected just outside the boundary of Hann Tableland National Park, NW of Mareeba. Near Undara, towards the middle of its distributional range, a single collection (*Cumming & Smith 25117*) represents the only known population formally protected within the Undara Volcanic National Park. Four other specimens collected near this locality were found on swampy ground outside the northern boundary of the National Park. Given that *Utricularia* is usually obligately aquatic or helophytic (Jobson & Morris 2000), it is likely that collectors have often missed this species due to the seasonally ephemeral nature of these habitats (Fig. 3). Further study is required to determine the conservation status of this species.



Fig. 2. Northern Australia showing the known distribution of *Utricularia blackmanii* (□), with closely related taxa (refer to key) and part of the Qld distribution of *U. dichotoma* indicated by triangles. Elevation is indicated by shading [from darker (green) of 1–100 m to white at ~1000 m];



Fig. 3. Ephemeral wetland habitat near Undara, Queensland, containing a population of *Utricularia blackmanii*.

Notes. Previously *U. blackmanii* has been confused with *U. dichotoma*, although there was some early hesitation by Taylor regarding its identity. Nevertheless, a comparison of inflorescence structure alone (Figs. 5a, b) reveals features that differ widely from the current circumscription of *U. dichotoma* (Taylor 1989), most notably the presence of a hollow peduncle, in addition to the shape and white coloration of the central palate ridges. Across the highly variable *U. dichotoma*, a species complex distributed in all states and territories of Australia, except the Northern Territory, there is a fair degree of variation in the shape of these lower lip ridges (pers. observations; Taylor 1989). To bring such variation into focus relative to North Queensland, the *U. dichotoma* image shown in Figure 5 represents a specimen from the Leichhardt region of Queensland (Jobson 1305, NSW886170).

Similarly, and until recently, *U. dichotoma* has also been allied with *U. uniflora* R.Br., based mainly on the general shape of the corolla. The main differences between these taxa involve the length of the ridges at the base of the lower lip and the always single-flowered inflorescences in *U. uniflora* (Taylor 1989) and it was not until the molecular genetic studies of Reut and Jobson (2010) that *U. uniflora* was placed in a distant clade.

Based on the current assessment of morphological characters (refer to Key to Species), *U. blackmanii* is hereby considered a member of ‘group B’, as described in the phylogenetic study of Reut and Jobson (2010). All members of this group share a tubulate peduncle (refer to Key to Species) and *U. blackmanii* shares many characters in common with one of the group’s members: *U. triflora*; a species known only from restricted areas south-east and west of Darwin (Fig. 2; Taylor 1989).

The most salient of these characters is the subulate shaped corolla spur with an acute apex, white lower lip palate and flowers arranged in a terminal whorl (Figs. 1, 4a, b). However, *U. blackmanii* (Fig. 4a) can be distinguished from *U. triflora* (Fig. 4b) by the presence of raised ridges at the base of the lower lip; whereas in *U. triflora* the basal region is a white patch that is only slightly raised above the palate surface; this patch is also broadly rimmed with purple, in contrast to the thin purple margin seen in *U. blackmanii*. The lower-lip of *U. triflora* is always distinctly 3-lobed, but only vaguely so in *U. blackmanii* and the upper-lip of *U. blackmanii* (Fig. 4a) is emarginate or shallowly bilobed, whereas it is deeply emarginate to bilobed in *U. triflora* (Fig. 4b).

Key to Related Species

(Australian State and Territory abbreviations: N.S.W. = New South Wales; N.T. = Northern Territory; Qld = Queensland; Tas. = Tasmania; Vic. = Victoria; W.A. = Western Australia)

- 1a. Peduncle solid; lower lip of corolla dark purple with conspicuous ridges at base, central ridges yellow *U. dichotoma* (Qld, N.S.W., W.A., Vic., S.A., Tas.)
- 1b. Peduncle hollow 2
- 2a. Freely suspended aquatic; leaves verticillate, narrowly linear; peduncle inflated; corolla very pale pink with a very slender spur, 15–20 mm long *U. tubulata* (W.A., N.T., Qld)
- 2b. Terrestrial or affixed aquatic; leaves not verticillate 3
- 3a. Leaf apex acuminate 4
- 3b. Leaf apex acute to rounded 5
- 4a. Corolla white or very pale violet, 15–20 mm long, lower lip transversely elliptic, entire, the upper lip apex truncate to emarginate *U. terrae-reginae* (Qld)
- 4b. Corolla violet 6–12 mm long; lower lip quadrate, obscurely 3- or 4-crenate; upper lip apex deeply 2-lobed *U. hamiltonii* (W.A., N.T.)
- 5a. Spur of corolla subulate, with apex acute 6
- 5b. Spur of corolla cylindrical or conical, with apex obtuse 7
- 6a. Corolla mauve with slightly raised white 5-lined blotches at base of lower lip and yellow patch at extreme base of palate *U. triflora* (N.T.)
- 6b. Corolla light violet with five prominently raised white ridges at base of lower lip *U. blackmanii* (Qld)
- 7a. Corolla purple-violet, lower lip at least twice as long as spur *U. singeriana* (W.A., N.T.)
- 7b. Corolla white, lower lip shorter than spur *U. fistulosa* (W.A., N.T.)

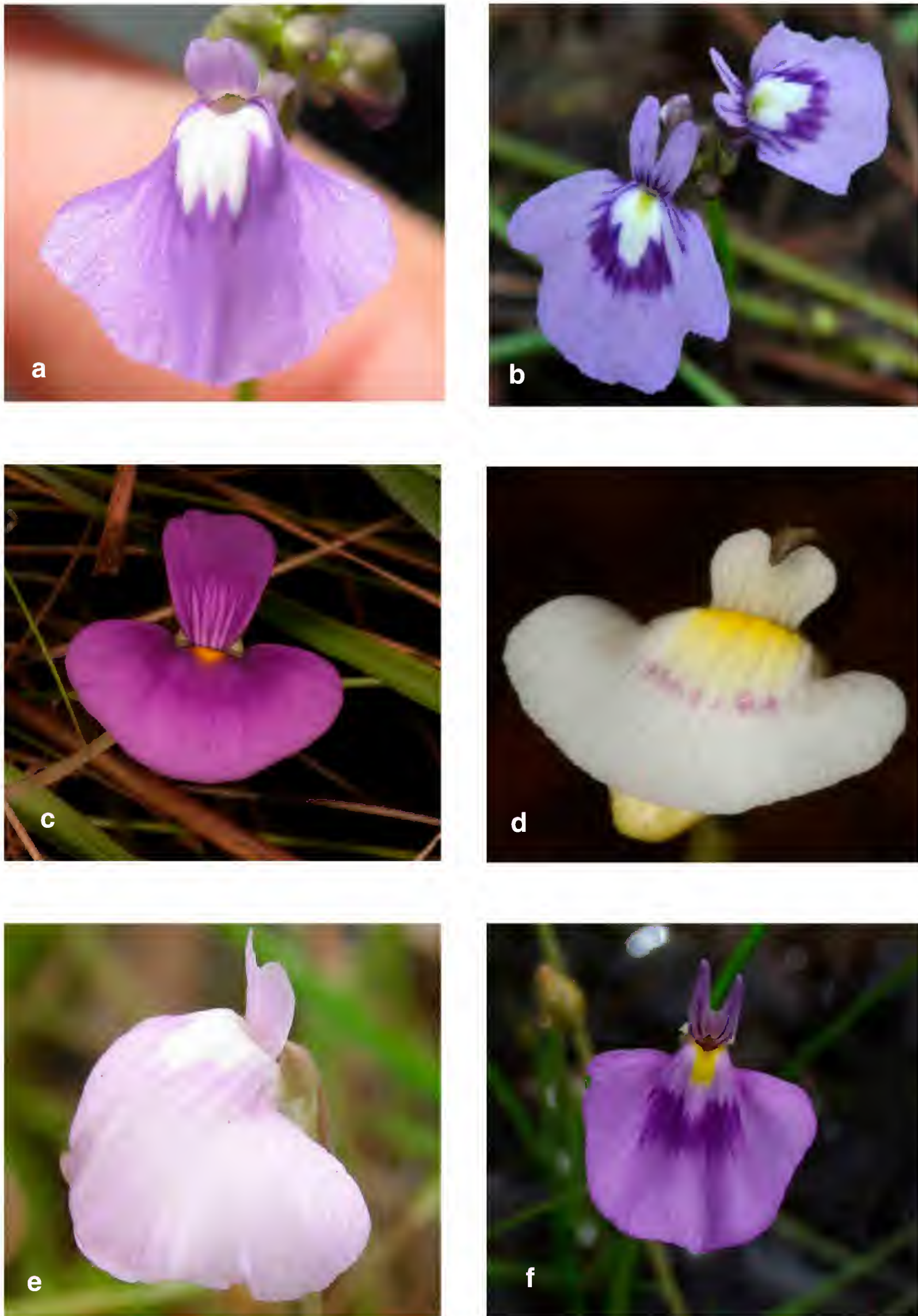


Fig. 4. Floral variation **a**, *Utricularia blackmanii*, and closely allied species **b**, *U. triflora*, **c**, *U. singeriana*, **d**, *U. fistulosa*, **e**, *U. terrae-reginae*, and **f**, *U. hamiltonii*. Not to same scale.

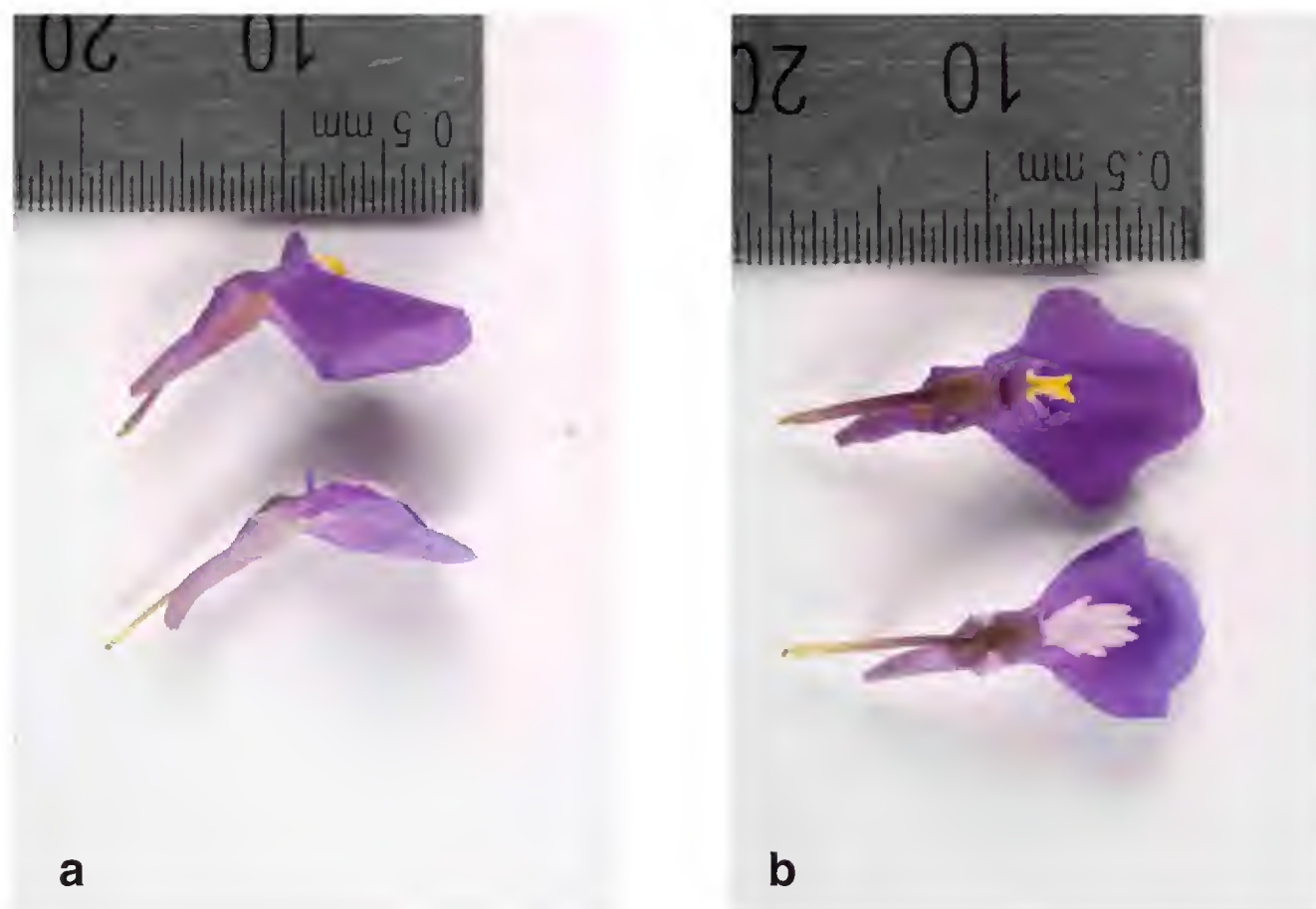


Fig. 5. Comparison of floral form **a**, lateral view, and **b**, dorsal view in *Utricularia dichotoma* (top) versus *U. blackmanii* (bottom). Both to indicated scale.

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